244LD Intelligent Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density

The intelligent transmitter 244LD is designed to perform continuous measurements for liquid level, interface or density of liquids in the process of all industrial applications. The measurement is based on the proven Archimedes buoyancy principle and thus extremely robust and durable. Measuring values can be transferred analog and digital. Digital communication facilitates complete operation and configuration via PC or control system. Despite extreme temperatures, high process pressure and corrosive liquids, the 244LD measures with consistent reliability and high precision. It is approved for installations in contact with explosive atmospheres. The 244LD combines the abundant experience of FOXBORO ECKARDT with most advanced digital technology.

FEATURES

- Communication HART, PROFIBUS PA or FOUNDATION Fieldbus
- Conventional operation with local keys
- Easy adaptation to the measuring point without calibration at the workshop
- Backdocumentation of measuring point
- Continuous self-diagnostics
- Configurable safety value
- Software lock for local keys and reconfiguration
- Approved for SIL applications
- Simulation of analog output for loop-check
- Local display in %, mA or physical units
- Signal noise suppression by Smart Smoothing
- Linear or customized characteristic
- Process temperature from –196 °C to +400 °C
- Materials for use with aggressive media
- Micro sintermetal sensor technology
- Separate mounting of sensor and amplifier with remote amplifier mounting kit

FOXBORO ECKARDT

TECHNICAL DATA

Data refer to the sensor material Type 316L (1.4404)

Explosion protection certificates must be observed!

Input / Output

Measuring ranges . . . . . 50 mm to 50 m
upper and lower range value continuously adjustable

Standard lenghts of
Displacer (104DE) . . . . . 350 .. 3000 mm, 14 .. 120 in; further lenghts on request

Weight of displacer [1] . . . . . max. 25 N

Measuring span . . . . . 2... 20 N contin. adjustable (to 1 N on request)

Span ratio
Turn-down . . . . . 1:1 .. 1:10 (1:20 on request)

Accuracy [2] . . . . . ± 0.2 % ; increased accuracy with customized adjustment

Transfer function . . . . . linear or customized with up to 32 setpoints [3]

Configuration
- with local push buttons and LCD
- Digital (see communication ...)

Local display . . . . . LCD 5 digits, configurable in %, mA or phys. units

Load . . . . . $R_{Bmax} = (U_S - 12V) / 23$ mA

Communication HART

Connection . . . . . Two-wire system
Supply voltage U_S: . . . . . 12 .. 42 V DC [6], V_{SS} ≤1%
Current sink . . . . . max. 23 mA
Signal range . . . . . 4 .. 20 mA
Operating range . . . . . 3.8 .. 21 mA
Digital communication . . . . . HART Protocol, 1200 Baud
Hand held terminal . . . . . HHT 991
PC Software . . . . . PC20 / ABO991
Hardware . . . . . HART Modem MOD991 for PC
Min. load . . . . . 250 Ω

Failure handling
Substitute value. . . . . last value or safety value
Safety value . . . . . 3.6 ... 23 mA, adjustable
Reset substitute value . . . . automatically or manual
Select messages. . . . . Internal calibration failed,
Pressure peaks ≥ 150 %,
Data access failed,
Over range ≥ 110 %,
Ambient temp. out of limits,
Process temp. out of limits,
Measuring range invalid

Communication PROFIBUS PA

Connection . . . . . twisted and shielded two wire cable acc.to recommendation based on IEC 1158-2
Supply voltage U_S: . . . . . 9 .. 32 V DC [5], V_{SS} ≤1%
Operating current . . . . . 10.5 mA ± 0.5 mA (base current)
Digital communication . . . . . PROFIBUS PA protocol, acc. to class B profile, EN 50170 and DIN 19245 part 4
Signal amplitude . . . . . ± 8 mA
Fault current . . . . . ≤ 13 mA
Operating values . . . . . according to IEC 1158-2
Bus connection. . . . . Fieldbus interface based on IEC 1158-2
Power supply . . . . . Power supply is achieved dependant on the application by means of segment coupler
GSD file . . . . . the actual file can be downloaded from our homepage

Configuration
Software. . . . . PC20 for PC
Hardware . . . . . PC- or PCMCIA-interfaces from Softing
Control systems . . . . . PROFIBUS PA compatible

Failure handling
Substitute value. . . . . last value or safety value
Safety value . . . . . adjustable -110 .. +110 % of out
Reset substitute value . . . . automatically or manual
Select messages . .
Internal calibration failed,
Sensor value out of range
Memory access failed
Measuring range out of sensor range
Ambient temp. out of limits,
Process temp. out of limits,
Measuring range invalid

1) For measurement of interface or density:
weight ≤ 25 N + buoyant force at lowest density
2) Accuracy acc. ANSI / ISA - S51.1 - 1979
3) Customized not with FoxCom
4) Reset of substitute value after pressure peaks automatically
5) With explosionproof device 9 .. 24 V
6) With explosionproof device 12 .. 30 V

Communication FOUNDATION Fieldbus

Connection . . . . . twisted and shielded two wire cable acc.to recommendation based on IEC 1158-2
Supply voltage U_S: . . . . . 9 .. 32 V DC [1], V_{SS} ≤1%
Operating current . . . . . 10.5 mA ± 0.5 mA (base current)
Digital communication . . . . . FF specification Rev. 1.4, Link-Master (LAS)
- Signal amplitude . . . . . ± 8 mA
- Fault current . . . . . ≤ 13 mA
- Operating values . . . . . according to IEC 1158-2
- Bus connection . . . . . Fieldbus interface based on IEC 1158-2
- Power supply . . . . . Power supply is achieved dependant on the application by means of segment coupler
- File . . . . . the actual file can be downloaded from our homepage

Configuration
- Software . . . . . National Instruments NI-FBUS Configurator
- Hardware . . . . . FBUS interfaces from National Instruments (AT-FBUS and PCMCIA- FBUS)
- Control systems . . . . . FOUNDATION Fieldbus H1 compatible

Failure handling
- Substitute value . . . . . last value or safety value
- Safety value . . . . . adjustable -110 .. +110 % of out
- Reset substitute value . . . . automatically or manual
- Select messages . .

Internal calibration failed,
Sensor value out of range
Memory access failed
Measuring range out of sensor range
Ambient temp. out of limits,
Process temp. out of limits,
Measuring range invalid

Operating conditions [2]

Process temperature . . . . . –196 °C ... +400 °C
Pressure rating
- acc. to DIN . . . . . PN 16, 40, 63, 100, 160, 250
- acc. to ANSI . . . . . Class 150, 300, 600, 900, 1500

Ambient temperature [3] [4]
- without indicator . . . . . –40 °C ... +85 °C
- with LCD indicator . . . . . –40 °C ... +70 °C [5]

Relative humidity . . . . . ≤ 100%
Condensation . . . . . permitted
Transportation-storage temperature . . . . . –50 °C ... +85 °C
Protection . . . . . IP 66 (acc. DIN 40 050)

The device can be operated at a class D2 location in accordance with DIN IEC 654, part 1.

Operation condition effects

Ambient temperature . . . . . –10 °C ... +70 °C
- Zero . . . . . ≤ 0.1 % / 10 K [6]
- Span . . . . . ≤ 0.07 % / 10 K
- Total

$$(0.1\frac{\text{max. sp.}}{\text{adjusted sp.}} \pm 0.07\frac{\text{measured value}}{\text{adjusted sp.}})\% / 10K$$

(*sp.* = measuring span)

< -10 °C / > +70 °C . . . . . twice the value
Process temperature . . . . . ≤ 0.1 % / 10 K [6]
Operating pressure . . . . . no influence (vakuum resistant)

Transitional behavior

Dynamic behavior
- Damping (90%-time) . . . . . 0 ... 32 s
- Switch-on time . . . . . 7 s
- Step response (63%-time)
- with damping 0 s . . . . . 250 ms

Update rate 10/s
Long term stability . . . . . ≤ 0.2 % / 6 months at 20°C [6]
Noise suppression
- Common mode voltage . . . ≤ AC 250 V_{eff}
- Common mode rejection . . 120 dB
- Series mode rejection . . . . 50 dB
- Mains synchronization . . . . 50 Hz / 60 Hz
- Filter . . . . . Smart Smoothing

1) With explosionproof device 9 .. 24 V
2) Not with all materials - see Table of Comparison of Materials page 7
3) Ambient temperature must not exceed 50°C at measuring module housing, when process medium or heating of medium exceed 300°C
4) –50 °C on request
5) Display invisible at T < –30 °C
6) For max. measuring span

Material, Pressure Rating & Contact Face, Mounting Direction

see Model Codes

Material Amplifier housing . . Aluminum
(Alloy No. GD-Al Si 12),
Polyurethan coated

For Sour Gas applications acc. to NACE Standard MR-0175-95:
Wafer body 316L (1.4404)
Torque tube . . . . . Hastelloy C or Inconel 600
see Model Codes

Mounting

Mounting method . . . . . sandwich mounted
acc. to DIN . . . . . DN 80, DN 100
acc. to ANSI . . . . . 3 inch, 4 inch
see Model Codes

Accessories for separate
mounting of amplifier . . . . . remote amplifier mounting kit
Length of cable . . . . . 3 m / 10 m

Weight

Transmitter . . . . . see table page 7
Displacer . . . . . see table page 10

Electrical connection

Cable entry thread . . . . . M20x1.5 or 1/2-14 NPT
Cable gland and screwed sealing plug have to be ordered separately under model code BUSG ...

For equipment in Ex d version, 1 screwed sealing plug made of stainless steel is included in delivery.
Screw terminals . . . . . wire cross-section up to 2.5 mm²
Test sockets . . . . . Ø 2 mm

Electromagnetic compatibility EMC

Operating conditions . . . . . industrial environment
Immunity according to
EN 61326 (3/2002) . . . . . fulfilled
Emission according to
EN 61326 (3/2002) . . . . . fulfilled
EN 55011, May 2000,
Group 1, Class A. . . . . fulfilled
EN 50081-2. . . . . fulfilled
NAMUR recommendation Ne21 Status Aug.1998 fulfilled

SAFETY REQUIREMENTS

CE Label

Electromagnetic
compatibility . . . . . 2004/108/EC fulfilled
Explosion protection acc. to ATEX . . . 94/9/EC

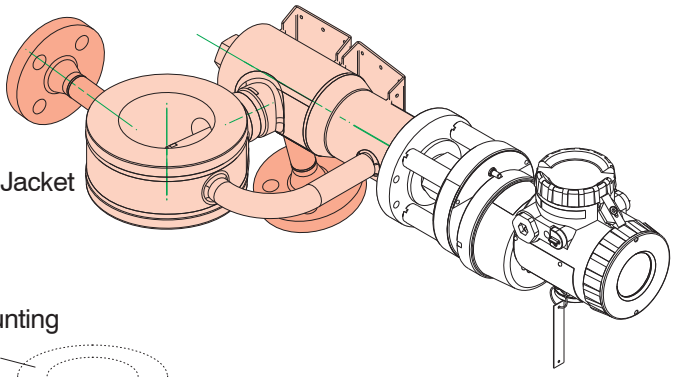
Safety

According to EN 61010-1
(resp. IEC 1010-1) . . . . . safety class III

Internal fuses . . . . . none (or not replaceable by customer)

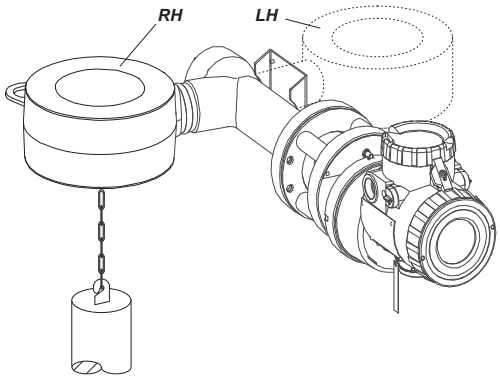
External fuses . . . . . Limitation of power supplies for fire protection have to be observed due to EN 61010-1, appendix F (rsp. IEC 1010-1)

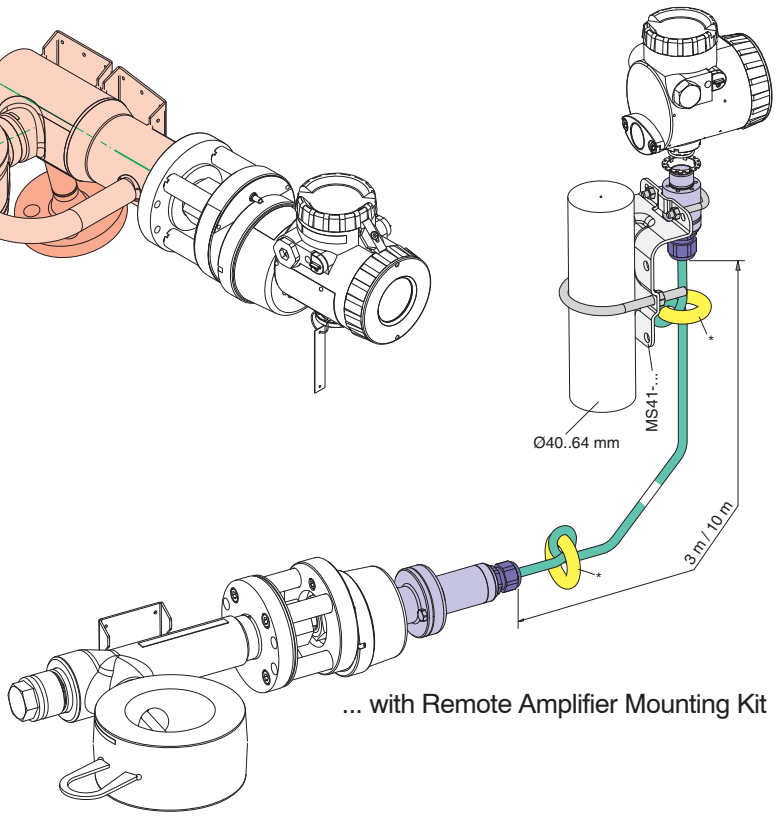
244LD versions ...



... with Heating Jacket

... for Left Hand or
Right Hand mounting





... with Remote Amplifier Mounting Kit

Electrical classification ATEX [2) 3)]

intrinsic safe:				
AI 408	HART / FoxCom electronics [1)]	II 2 G EEx ia/ib IIC T4	PTB 01 ATEX 2168	Zone 1
AI 428	PA/FF electronics	II 2 G EEx ia IIC T4/T6	PTB 01 ATEX 2156	Zone 1
mounted with:				
AI 432	Wafer body 244LD (no gap redu. bush)	II 2 G EEx ia IIC T6/T4	PTB 01 ATEX 2177	Zone 1
AI 432 A	Wafer body 244LD (no CS_2)	II 1/2 G EEx ia IIC T6/T4	PTB 01 ATEX 2177	Zone 0
explosion-proof:				
AD 931	Housing for PA-FF-HART-FoxCom [1)]	II 2 G EEx d IIC T6	PTB 02 ATEX 1025 X	Zone 1
mounted with:				
AD 432	Wafer body 244LD (no gap redu. bush)	II 2 G EEx d IIC T6	PTB 02 ATEX 1142	Zone 1
AD 432 A	Wafer body 244LD (no CS_2)	II 1/2 G EEx d IIC T6	PTB 02 ATEX 1142	Zone 0
intrinsic safe and auxilliary protection:				
AID421	Housing for PA-FF-HART-FoxCom [1)]	II 2 G EEx ia d IIC T6	PTB 04 ATEX 2011 X	Zone 1
mounted with:				
AD 432	Wafer body 244LD (no gap redu. bush)	II 2 G EEx d IIC T6/T4	PTB 02 ATEX 1142	Zone 1
AD 432 A	Wafer body 244LD (no CS_2)	II 1/2 G EEx d IIC T6/T4	PTB 02 ATEX 1142	Zone 0
Zone 2:				
AN 408	HART/FoxCom electronics [1)]	II 3 G EEx ia/ib IIC T4	Manufacturer's Declaration	Zone 2
AN 428	PA/FF electronics	II 3 G EEx ia IIC T4/T6	Manufacturer's Declaration	Zone 2
mounted with:				
AN 432	Wafer body 244LD (no gap redu. bush)	II 3 G EEx ia IIC T6/T4	PTB 01 ATEX 2177	Zone 2

Further National certificates

- Overfill protection according to WHG

- Bauteileprüfung von Wasserstand-Stetigreglern
(VdTÜV Wasserstand 100)

International Certificates

FM Certification

Intrinsically Safe / I, II, III /1 / ABCDEFG / T4 Ta=85°C
Nonincendive / I /2 / ABCD /T4 Ta=85°C
Special Protection / II /2 /FG /T4 Ta=85°C
Special Protection / III /1,2 /T4 Ta=85°C
Type 4X
Entity Parameters:
Vmax=30 V, Imax=150 mA, Ci=2,45 nF, Li=0,14 mH

CSA Certification *

RUSSIAN "Intrinsic safety"

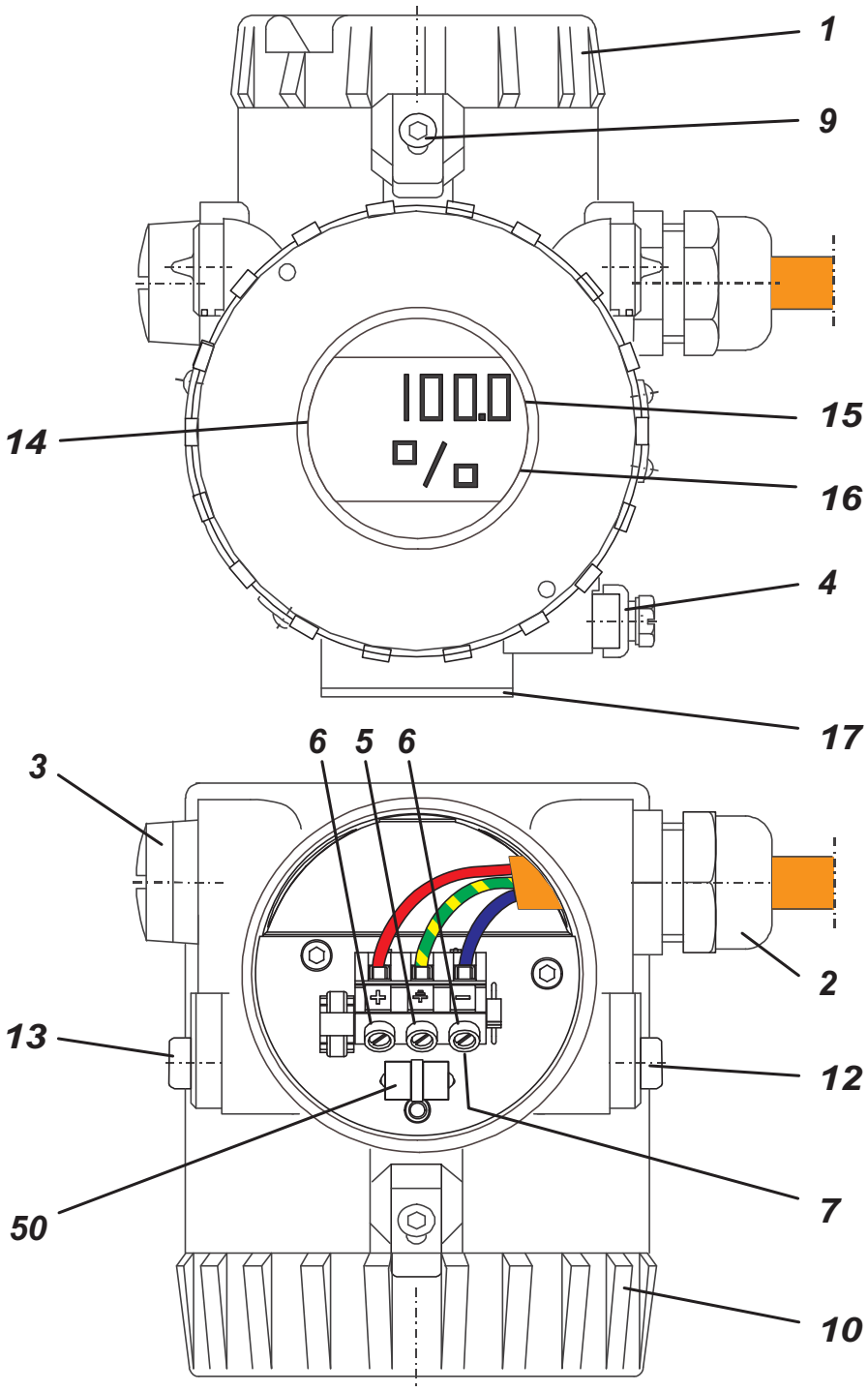
RUSSIAN "Explosionproof"

Belarus - Certificate Number 2176

- Further protection types of on request -

* In preparation
1) Electrical data see EC Certificates of Conormity
2) With appropriate order only
3) National requirements have to be observed

CONNECTIONS, OPERATIONAL ELEMENTS



1 Cover for terminal compartment
2 Cable gland
3 Plug, interchangable by Pos. *2*
4 External ground connection
5 Internal ground connection
6 Terminals (+ / -)
7 Test sockets ∅ 2 mm integrated in terminals
9 Security lock for EEx d version
10 Cover for amplifier housing (with local display)
12 Local key for lower range value / zero
13 Local key for upper range value / damping
14 LCD indicator
15 Measuring variable
16 Engineering unit
17 Bottom housing cover
50 Overvoltage protection (if present)

Comparison of Material

Code	WNr	DIN	Remarks	equivalent to
St 35	1.0308	2391		ASTM A 519 - 1020
St 35.8 III	1.0305	17 175		
C 21	1.0432	–	VdTÜV - Wbl. 399 (for ANSI flanges only)	ASTM A 105
C 22.8	1.0460	EN 10 273	VdTÜV - Wbl. 350/3	ASTM A 576 - 1020
X6 CrNiMoTi 17 12 2	1.4571	17 440		~ ASTM Typ 316Ti
X2 CrNiMo 17 13 2	1.4404			ASTM Typ 316L
X2 CrNiMo 18 14 3	1.4435			
X5 CrNiMo 17 13 3	1.4436			
NiMo 16 Cr 15 W	2.4883	17 744	equivalent to Hastelloy C-276 VdTÜV - Wbl. 400	UNS N 12 276
NiCr 15 Fe	2.4816	17 742	Inconel 600 VdTÜV - Wbl. 305	UNS N 06600
GD - AlSi 12	3.2582.05	17 007	Al - Diecasting	

Service Limits

Nominal pressure		C22.8 (~ A105)						316 / 316L (1.4404 / 1.4571) /Hastelloy C [1]						
		Max. operating pressure in bar at temperature in °C												
		–60 ... –10[2]	–10 ... 120	200	250	300	350	–196 ... –60[2]	–60 ... –10	–10 ... 50	100	200	300	400
PN 16	DIN 2633	12	16	13	11	9	8	16			12	9	7	
PN 40	DIN 2635	30	40	35	32	27	21	40			35	32	28	25
PN 63	DIN 2636	48	64	50	45	39	30	64			57	51	45	33
PN 100	DIN 2637	73	98	80	70	60	48	100			95	80	70	64
PN 160	DIN 2638	120	160	130	112	96	90	160			142	128	113	97
PN 250	DIN 2628	187	250	200	175	150	140	250			230	200	177	162
Class 150		14	16	14	12	10	8	19		18	16	13	10	6
Class 300		38	46	43	41	38	37	49			42	35	31	27
Class 600		76	92	87	83	77	73	99			84	71	63	58
Class 900		114	139	131	123	116	110	148			126	107	94	87
Class 1500		191	231	219	206	180	145	248			211	178	158	145

Table of Weights

Transmitter with wafer body and measuring module housing	Weight [kg]					
	DIN PN		ANSI Class			
	16 ... 160	250	150	300 / 600	900	1500
DN 80 / 3 inch	12.5	12.5	12.5			16
DN 100 / 4 inch	13.5	13.5	13.5			18.5

Table of versions (for dimensions c, d, g see drawing on page 12)

Version		Form of Sealings			DN 80 / 3 inch				DN 100 / 4 inch			
	PN	Type E, DIN 2526	Type N, DIN 2512	Type L, DIN 2696	c	d	g		c	d	g	
DIN	16	:	:		140	82	138		160	102	162	
	40	:	:									
	63	:	:									
	100	:	:	:								
	160	:	x	:								
	250	x		x								
							RF	RJF			RF	RJF
ANSI	150	Raised Face (RF), ANSI B16.5, Ring Joint Face (RJF), ANSI B16.5			140	82	140	140	160	102	162	174
	300							147				
	600											
	900											
	1500							162				206

1) With material wafer body Hastelloy C: max. PN 100 / Class 600
2) On request

MODEL CODES 244LD

Intelligent Buoyancy Transmitter with Torque Tube	**244LD**											010611
Wafer Body Material (Process wetted):												
Carbon Steel 1.0460 (~A 105), application from –10°C to +350°C	-K											
1.4404 equivalent to 316L / 1.4435, application from –60°C to +400°C (material is 1.4435 when Wafer Body Pressure Rating codes H1and H2 selected)	-S											
1.4404 equivalent to 316L / 1.4435, application from –196°C to +400°C (material is 1.4435 when Wafer Body Pressure Rating codes H1and H2 selected)	-U											
1.4404 equivalent to 316L / 1.4435, application from –60°C to +500°C (material is 1.4435 when Wafer Body Pressure Rating codes H1and H2 selected)	-T											
Duplex - 1.4462, application from –10°C to +280°C (no PED Certification)	-N											
Inconel 625 - 2.4856, application from –10°C to +450°C (no PED Certification)	-A											
Inconel 825 - 2.4858, application from –10°C to +450°C (no PED Certification) (p)	-I											
Hastelloy C , application from –196°C to +400°C	-C											
Torque Tube Material (Process wetted):												
1.4404 equivalent to 316L		S										
Hastelloy C		C										
Inconel 600 - 2.4816		I										
Monel K500- 2.4375		M										
Wafer Body Flange Size (Nominal size):												
DN70 (available with Wafer Body Material S, U, T and Torque Tube Material S and C)			0									
DN80			1									
DN100			2									
3-Inch			3									
4-Inch			4									
Wafer Body Pressure Rating & Contact Face												
PN40 (PN16 to PN40) B1/B1 (Contact Face DIN EN 1092-1)				(a)			B1					
PN250 (PN16 to PN250) B2/B2 (Contact Face DIN EN 1092-1) (Draft DIN EN 1092-1:2005-04)				(a)			B2					
PN250 (PN16 to PN250) D/C (Contact Face DIN EN 1092-1) (Draft DIN EN 1092-1:2005-04)				(a)(r)			DC					
PN250 (PN16 to PN250) D/D (Contact Face DIN EN 1092-1) (Draft DIN EN 1092-1:2005-04)				(a)			DD					
PN250 (PN16 to PN250) F/F (Contact Face DIN EN 1092-1) (Draft DIN EN 1092-1:2005-04)				(a)			FF					
PN250 (PN16 to PN250) F/E (Contact Face DIN EN 1092-1) (Draft DIN EN 1092-1:2005-04)				(a)(s)			FE					
PN250 (PN16 to PN250) L/L (Contact Face DIN 2696)				(a)			L1					
PN400 L/L Lense (Contact Face DIN 2696)				(k) (n)			H1					
PN500 L/L Lense (IG-Norm High Pressure Version)				(i) (n)			H2					
ANSI Class 150 RF/RF				(b)			R1					
ANSI Class 900 (300/600/900) RF/RF				(b)			R2					
ANSI Class 1500 RF/RF				(b)			R3					
ANSI Class 150 SF/SF				(b)			S1					
ANSI Class 900 (300/600/900) SF/SF				(b)			S2					
ANSI Class 1500 SF/SF				(b)			S3					
ANSI Class 150 RJF/RJF				(b)			J1					
ANSI Class 900 (300/600/900) RJF/RJF				(b)			J2					
ANSI Class 1500 RJF/RJF				(b)			J3					
ANSI Class 300 to 1500, Form LF/LM				(b)			LM					
ANSI Class 300 to 1500, Form LF/LF				(b)			LF					
ANSI Class 300 to 1500, Form LG/LT				(b)			LT					
ANSI Class 300 to 1500, Form LG/LG				(b)			LG					

(continued on next page)

MODEL CODES 244LD (continued)

(Wafer Body Pressure Rating & Contact Face)							
ANSI Class 150, Form SG/ST	(b)	GT					
ANSI Class 300 to 1500, Form SG/ST	(b)	ST					
ANSI Class 150, Form SG/SG	(b)	GG					
ANSI Class 300 to 1500, Form SG/SG	(b)	SG					
Wafer Body Mounting Direction: (Amplifier to body)							
Right Hand mounted			R				
Right Hand mounted with heating jacket -							
- connecting flanges B1 / DN15, PN40 (DIN EN 1092-1)	(m) (o)		A				
- connecting flanges B1 / DN25, PN40 (DIN EN 1092-1)	(m) (o)		B				
- connecting flanges B2 / DN15, PN40 (DIN EN 1092-1)	(m) (o)		C				
- connecting flanges B2 / DN25, PN40 (DIN EN 1092-1)	(m) (o)		D				
- connecting flanges RF/SF, 1/2 in, Class 300	(m) (o)		E				
- connecting flanges RF/SF, 1 in, Class 300	(m) (o)		F				
- connecting flanges RJF, 1/2 in, Class 300	(m) (o)		G				
- connecting flanges RJF, 1 in, Class 300	(m) (o)		H				
Left Hand mounted			L				
Left Hand mounted with heating jacket -							
- connecting flanges B1 / DN15, PN40 (DIN EN 1092-1)	(m) (o)		M				
- connecting flanges B1 / DN25, PN40 (DIN EN 1092-1)	(m) (o)		N				
- connecting flanges B2 / DN15, PN40 (DIN EN 1092-1)	(m) (o)		O				
- connecting flanges B2 / DN25, PN40 (DIN EN 1092-1)	(m) (o)		P				
- connecting flanges RF/SF, 1/2 in, Class 300	(m) (o)		S				
- connecting flanges RF/SF, 1 in, Class 300	(m) (o)		T				
- connecting flanges RJF, 1/2 in, Class 300	(m) (o)		U				
- connecting flanges RJF, 1 in, Class 300	(m) (o)		V				
Version:							
Base VERSION - TRANSSTAR- (244LD)				B			
Base VERSION - LEVELSTAR- (244LD)	(f)(v)			N			
Base (B) + Displacer (244LD + 204DE)				S			
Base (N) + Displacer (244LD + 204DE)	(f)(v)			T			
Base (B) + Displacer + Displacer Camber + Flange combination + Flange (244LD + 204DE + 204DC + 204FK + 204BCF)	(h)			C			
Base (N) + Displacer + Displacer Camber + Flange combination + Flange (244LD + 204DE + 204DC + 204FK + 204BCF)	(f)(v)(h)			D			
Cable Entry:							
M20x1.5 without cable gland					M		
1/2-14 NPT without cable gland					N		
Communication:							
HART						H	
PROFIBUS-PA						P	
FOUNDATION Fieldbus H1						B	
Electrical Classification:							
ATEX intrinsic safe Zone 0, IIC T4 (HART)	(d)						0C4
ATEX Intrinsic safe Zone 0, IIC T6 (HART, PROFIBUS or FOUNDATION Fieldbus)	(d)						0C6
ATEX intrinsic safe Zone 1, IIC T4 (HART)							1C4
ATEX intrinsic safe Zone 1, IIC T6 (HART, PROFIBUS or FOUNDATION Fieldbus)							1C6
ATEX intrinsic safe Zone 2, IIC T4 (HART)							2C4
ATEX intrinsic safe Zone 2, IIC T6 (PROFIBUS or FOUNDATION Fieldbus) Zone 2, IIC T6 (HART) VERSION N, T, D	(c)						2C6
ATEX explosionproof Zone 0, IIC T6	(d)						D0C
ATEX explosionproof Zone 1, IIC T6							D1C
FM Nonincendive (HART) (PROFIBUS or FOUNDATION Fieldbus)	(c)						NFM
FM Explosionproof							FDZ
CSA Explosionproof							CDZ
FM Intrinsically Safe (HART) (PROFIBUS or FOUNDATION Fieldbus)	(c)						FAA
CSA Intrinsically Safe	(c)						CAA

(continued on next page)

MODEL CODES 244LD (continued)

(Electrical Classification)		
GOST-R Intrinsically Safe, T4 (HART)		GA4
GOST-R Intrinsically Safe, T6 (HART, PROFIBUS or FOUNDATION Fieldbus)		GA6
GOST-R Explosionproof, T6		GDZ
NEPSI Intrinsically Safe, T4 (HART)		NA4
NEPSI Intrinsically Safe, T6 (HART, PROFIBUS or FOUNDATION Fieldbus)		NA6
NEPSI Explosionproof, Ex d IIC T4-T6		NDZ
For General Purpose Areas; not Explosionproof		ZZZ
OPTIONS:		
Housing Complete Stainless Steel without external Pushbuttons (not available with Wafer Body Material codes K)		-H
Remote Amplifier Mounting Kit (3 m), Mounted	(e)(u)	-R
Remote Amplifier Mounting Kit (10m), Mounted	(e)(u)	-B
Tag No. Labeling		
Stainless Steel Label Fixed With Wire		-L
Stainless Steel Label Fixed On Amplifier		-F
National Certificates		
TA-Luft	(u)	-K
ABSA (Canada)	(u)	-A
Germanischer Lloyd	(q)(u)	-G
Certificates		
EN 10204-2.1 , Certificate Of Compliance		-1
EN 10204-2.2 , Specific Test Report (Calibration)		-2
EN 10204-3.1 , Inspection Certificate Of Process Wetted Material		-3
PED 97/23/EC additional unit verification, acc. to module F/G (Not available with Wafer Body Material codes N and I)		-4
Comply With NACE Standard MR-0175 (available with Torque Tube Material I, M or C)	(g)	-6
SIL 2 Certificate	(q)(u)	-Q
Material Test		
X-Ray And Isotope Test For Weldings		-7
Dye Penetration Test		-8
PMI - Test		-5
Subassemblies		
Torque Tube for selected code (244LD-*********-W)	(p)	-W
Amplifier for selected code (244LD-*********-X)	(p)	-X
Complete Sensor for selected code (244LD-*********-Y)	(p)	-Y
Wafer body for selected code (244LD-*********-Z)	(p)	-Z

Footnotes

(a) Available with Wafer Body Flange Size 1 or 2
(b) Available with Wafer Body Flange Size 3 or 4
(c) Pending
(d) Not available with Wafer Body Pressure Rating & Contact Face codes L1, J1, J2, J3, H1, H2, DD
(e) Not available with Electrical Classification FDZ, CDZ, 0C6, D0C, D1C, GDZ, NDZ or Optional Features -H
(f) only with Communication H (HART) and electrical Classification 0C6, 1C6, D0C, D1C, 2C6
(g) Restrictions concerning the limit of application for the used materials are to considering (NACE Standard MR-0175/2003, bzw. ISO 15156-3)
(h) Pending, order separately at this time.
(i) Available with Wafer Body Flange Size 0
(k) Available with Wafer Body Flange Size 1
(m) Not available with Wafer Body Flange Size code 4 with Wafer Body Pressure Rating code J3
(n) Not availabel with Wafer Body Material codes A, K,N, I, C or Torque Tube Material codes I and M
(o) Not available with Wafer Body Material codes A, K, U, N, I, C
(p) on request
(q) Available with HART
(r) D at top
(s) F at top
(u) Not applicable with Version N, T, D
(v) Pending Electrical Classsification FDZ, CDZ, GA4, GA8, GDZ

Displacer 204DE

Typical Dimensions and Weights for Density Ranges $\Delta\rho$ 1)

Material	316L (1.4404 / 1.4435) 2)													PTFE / PTFE with 25 % C				Hastelloy C			
Code	-S (PN 100)				-T 3) (PN 40 / 63)					-S (PN 250)				-S (PN 500)				-S (PN 100 / 160)			
	Density Range $\Delta\rho$																				
	250 ... 1500 kg/m³				100 ... 600 kg/m³					400 ... 2000 kg/m³				200 ... 1500 kg/m³				300 ... 1500 kg/m³			
Len. L	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar	ρ_{min} 4) kg/m³	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar
mm																					
350	60,3	1000	19	100	101,6	2840	38	40	460	42,4	500	18	250	62	1056	23	500	60,3	1000	18	100
500	48,3	920	17	100	88,9	3100	43	63	580	42,4	710	24	250	51	1021	23	500	48,3	920	19	100
750	42,4	1060	21	100	76,1	3410	44	63	545	33,7	670	21	250	42	1039	24	500	48,3	1370	27	100
1000	33,7	890	17	100	60,3	2855	41	63	545	26,9	570	18	250	35	961	21	500	33,7	890	19	100
1200	33,7	1070	20	100	60,3	3425	48	63	675	26,9	680	22	250	35	1153	25	500	33,7	1070	22	100
1500	26,9	850	16	100	51	3065	39	63	460	21,3	540	17	250	30	1060	24	500	26,9	850	18	160
1800	26,9	1020	19	100	42,4	2540	38	63	495	21,3	640	20	250	28	1107	25	500	26,9	1020	21	160
2000	26,9	1140	21	100	42,4	2825	41	63	565	21,3	710	22	250	25	981	22	500	26,9	1140	23	160
2500	21,3	890	20	100	38	2840	37	63	425	17,2	580	16	250	22,5	993	23	500	21,3	890	23	160
3000	21,3	1070	24	100	38	3400	45	63	575	17,2	700	23	250	20	942	22	500	21,3	1070	27	160
inch																					
14	60,3	1020	20	100	101,6	2885	38	40	455	42,4	510	18	250	62	1074	23	500	60,3	1020	18	100
32	42,4	1150	23	100	76,1	3700	47	63	595	33,7	730	23	250	42	1126	26	500	33,7	720	16	100
48	33,7	1090	20	100	60,3	3480	49	63	680	26,9	690	22	250	35	1171	26	500	33,7	1090	23	100
60	26,9	870	16	100	51	3115	40	63	465	21,3	540	18	250	30	1076	24	500	26,9	870	18	100
72	26,9	1040	19	100	42,4	2580	38	63	505	21,3	650	21	250	28	1124	26	500	26,9	1040	21	160
84	26,9	1210	22	100	42,4	3000	44	63	635	21,3	760	23	250	25	1046	24	500	26,9	1210	25	160
96	21,3	870	20	100	38	2765	37	63	420	17,2	570	16	250	22,5	968	22	500	21,3	870	23	160
120	21,3	1090	25	100	38	3455	46	63	595	17,2	710	24	250	20	957	22	500	21,3	1090	25	160

1) $\Delta\rho = \rho1 - \rho2$
$\rho1$ = density of lower medium
$\rho2$ = density of upper medium

2) Using displacer material 1.4571 can cause small deviations in diameter, volume and weight.

3) For measurement of interface or density, the max. density of the lower medium is 1350 kg/m³.

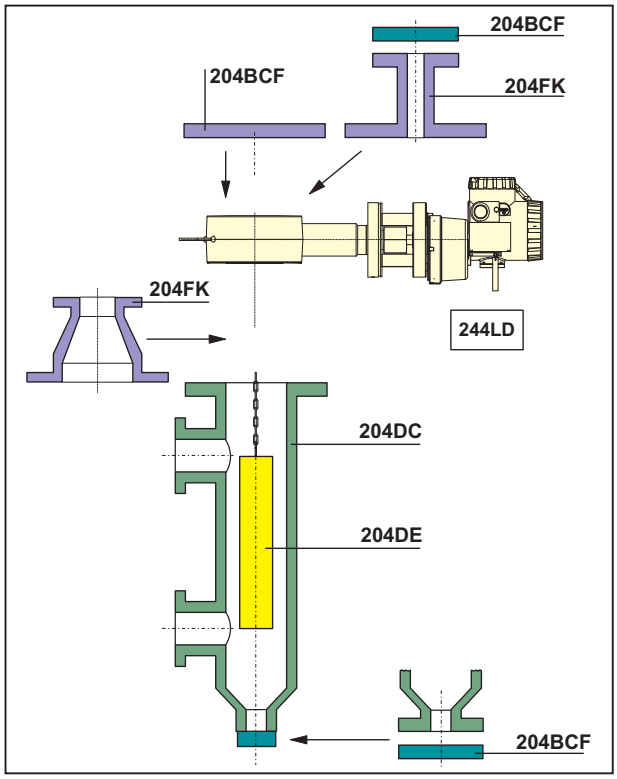
4) Min. density of the lower medium

If a Displacer Chamber is used, the difference between the diameter of the Displacer and the inside diameter of the Displacer Chamber must be at least 10 mm.

Lengths < 350 mm and > 3000 mm, and density ranges < 100 kg/m³ and > 2000 kg/m³ on request.

Accessories

For Displacer Chamber 204DC, Flange combination 204FK and Cover Flange Kit 204BCF see PSS EML0901, 204.. Accessories for Buoyancy Transmitter.



MODEL CODES 204DE

Displacer for Buoyancy Transmitters from 2N buoyancy up to 20N	**204DE**						010210
RANGE OF APPLICATION: (a)							
Liquid Level - Media: Liquid / Gas or Air							
(Density difference = 250 kg/m³ to 2000 kg/m³)							
(= 9x10-3 lbm/in3 to 72.2x10-3 lbm/in3)		-S					
Interface Level / Density - Media: Liquid 1 / Liquid 2							
(Density difference = 100 kg/m³ to 600 kg/m³)							
(= 3,6x10-3 lbm/in3 to 22.7x10-3 lbm/in3)		-T					
DISPLACER MATERIAL:							
316L (1.4404 / 1.4435 / 1.4571)			S				
PTFE (not for applications in Zone 0)			P				
PTFE With 25% Carbon			O				
Hastelloy C			C				
Inconel 625 (2.4856)			I				
Monel 400 (2.4360)			M				
Titan (3.7035)			T				
PRESSURE RATING:							
Up to PN 100 / Class 600				D			
Up to PN 160 / Class 900				E			
Up to PN 250 / Class 1500				F			
Up to PN 500 / Class 2500				G			
SUITABLE FOR FLANGE SIZE: (at Top of vessel/chamber)							
DN 50					0		
DN 70					1		
DN 80					2		
DN 100					3		
DN 150					4		
2 inch					5		
3 inch					6		
4 inch					7		
6 inch					8		
DISPLACER LENGTH "L": (inches are approx.)							
for Displacer Material codes P and O:							
300 mm (12 in) to 2000 mm (79 in) without partitioning						A	
2001 mm (79 in) to 4000 mm (157 in) One partition point						B	
4001 mm (157 in) to 6000 mm (236 in) Two partition points						C	
6001 mm (236 in) to 8000 mm (315 in) Three partition points						D	
8001 mm (315 in) to 10000 mm (394 in) Four partition points						E	
10001 mm (394 in) to 12000 mm (472 in) Five partition points						F	
for Displacer Material S, C, I, M and T:							
300 mm (12 in) to 3000 mm (118 in) without partitioning						K	
3001 mm (118 in) to 6000 mm (236 in) One partition point						L	
6001 mm (236 in) to 9000 mm (354 in) Two partition points						M	
9001 mm (354 in) to 12000 mm (472 in) Three partition points						N	
12001 mm (472 in) to 15000 mm (591 in) Four partition points						O	
MATERIAL AND LENGTH OF THE SUSPENSION: (Length "b") (d)							
316L / 1.4404 / ... Standard length of Suspension	(b)						S1
316L / 1.4404 / ... Customized Suspension-Length	(c)						S2
Hastelloy C Standard length of Suspension	(b)						C1
Hastelloy C Customized Suspension-Length	(c)						C2
Inconel Standard length of Suspension	(b)						I1
Inconel Customized Suspension-Length	(c)						I2
Monel Standard length of Suspension	(b)						M1
Monel Customized Suspension-Length	(c)						M2
Titan Standard length of Suspension	(b)						T1
Titan Customized Suspension-Length	(c)						T2

(continued on next page)

MODEL CODES 204DE (continued)

OPTIONS:

for application in Zone 0 (Additional grounding rope) (not available with Displacer Material: P)	-E
Damping Spring (Mat. 1.4310, Max. 250°C (482F)) (f)	-D
Damping Spring (Mat. HC, Max 350°C (662F)) (f)	-C
Degreased	-O
Tag No. Labeling Stainless Steel Label Fixed With Wire (Text required)	-L
Certificates	
EN 10204-2.1 Certificate Of Compliance	-1
EN 10204-3.1 Inspection Certificate Of Process Wetted Material (not available with Displacer Material: P and O)	-3
PMI - Test (not available with Displacer Material: P and O)	-5

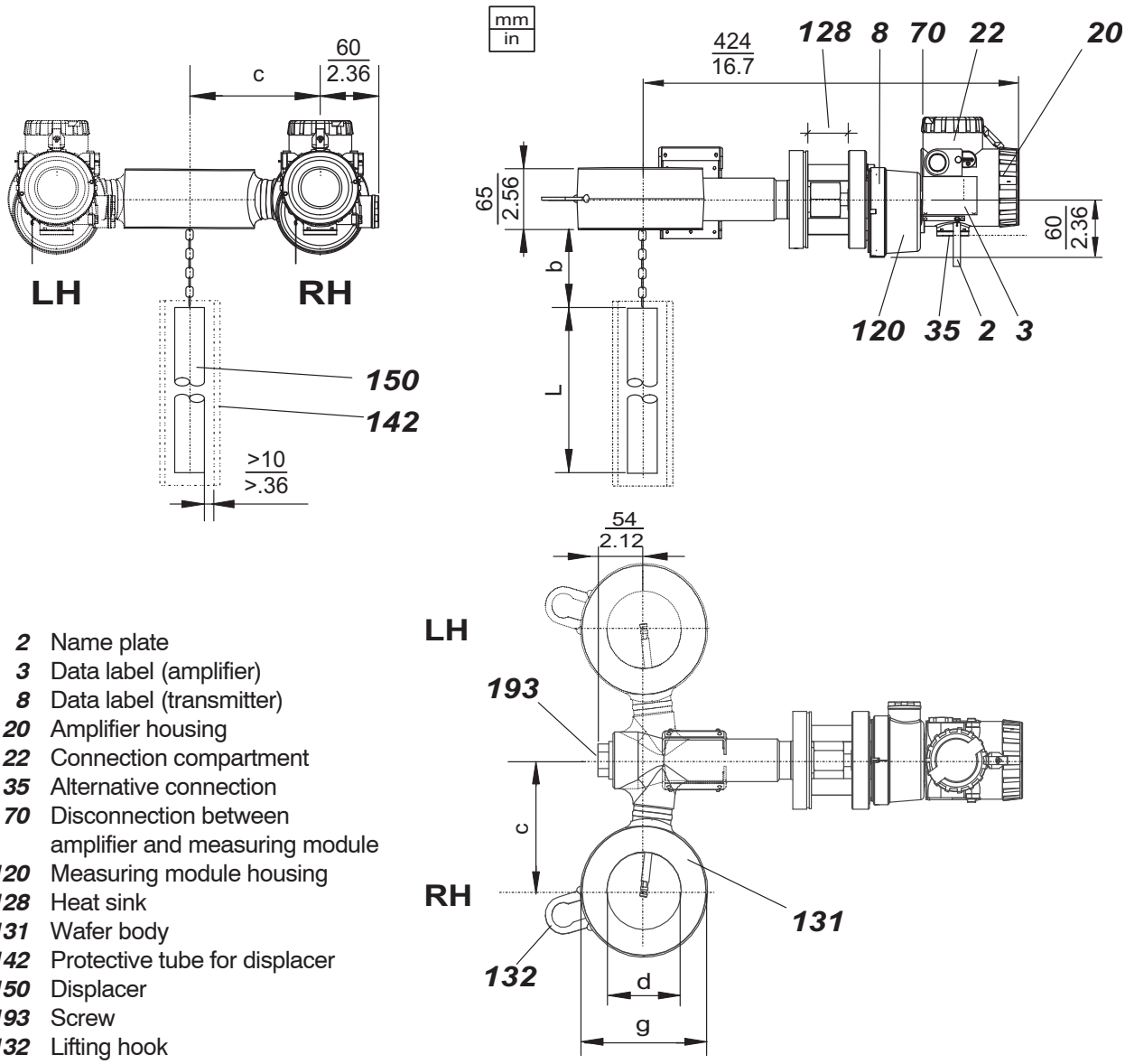
Footnotes
(a) Upper and Lower Medium Density required (at operating temperature)
(b) Only in connection with Modelcode 204DC
(c) Exact length required (Contact face of flange to upper end of displacer)
(d) All +/- 8mm (0.3 inch)
(e) Pending
(f) Required for 244LD Version B with Option -G

Product Specifications for Intelligent Transmitters

Product Specification:	Device:	
PSS EMP0610	141GP	Intelligent Gauge Pressure Transmitter
PSS EMP0620	142AP	Intelligent Absolute Pressure Transmitter
PSS EMP0630	143DP	Intelligent d/p Transmitter
PSS EML2610	144FP	Intelligent d/p Transmitter for Liquid Level, Interface and Density - Flange mounted
PSS EML0610	144LD	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer and Torque Tube
PSS EML0710 A PSS EML0710 G	244LD	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer and Torque Tube (A: *TransStar* G: *LevelStar*)
PSS EML1610	144LVD	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer
PSS EML1710	244LVP	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer
PSS EML0901	204xx	Accessories for Buoyancy Transmitters
PSS EMO0100		Accessories for Devices with HART-Protocol

Dimensions

244LD up to PN 250 / Class 1500



2	Name plate
3	Data label (amplifier)
8	Data label (transmitter)
20	Amplifier housing
22	Connection compartment
35	Alternative connection
70	Disconnection between amplifier and measuring module
120	Measuring module housing
128	Heat sink
131	Wafer body
142	Protective tube for displacer
150	Displacer
193	Screw
132	Lifting hook

LH Left Hand = mounting amplifier to wafer body “Left hand mounted” (Model Code L)
RH Right Hand = mounting amplifier to wafer body “Right hand mounted” (Model Code R)

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